CLAIMS

What is claimed is:

1. A method of modulating a systemic immune response to a peptide in a mammal, the method comprising transmucosally administering to the mammal a macromolecular aggregate of the peptide, thereby modulating a systemic immune response in the mammal.

2. A method of inducing a systemic immune response to a peptide in a mammal, the method comprising transmucosally administering to the mammal a macromolecular aggregate of the peptide, thereby inducing a systemic immune response in the mammal.

3. The method of claim 1 or 2, wherein the macromolecular aggregate comprises at least 10 peptide subunits.

4. The method of claim 1 or 2, wherein the macromolecular aggregate comprises a physical association of two or more units.

5. The method of claim 4, wherein the macromolecular aggregate is selected from the group consisting of a dimer and a multimer.

6. The method of claim 1 or 2, wherein the macromolecular aggregate comprises at least one of the members selected from the group consisting of twenty peptide subunits, an aggregate of a molecular weight in excess of 1,000 kD, and a combination of twenty peptide subunits and an aggregate of a molecular weight in excess of 1,000 kD.

7. The method of claim 1 or 2, wherein the macromolecular aggregate is at least 5 nm in diameter.

8. The method of claim 1 or 2, wherein the macromolecular aggregate is resistant to digestive degradation.

9. The method of claim 1 or 2, wherein the macromolecular aggregate is stabilized in aggregate form by chemical treatment.

10. The method of claim 1 or 2, wherein the macromolecular aggregate is stabilized in aggregate form by recombinant protein engineering of the peptide.

11. The method of claim 10, further comprising the stabilization of the macromolecular aggregate in aggregate form by chemical treatment.

12. The method of claim 1 or 2, wherein the peptide comprises a hepatitis B virus protein.

13. The method of claim 12, wherein the peptide is selected from the group consisting of a hepatitis B viral surface protein, a hepatitis B viral nucleocapsid protein, and a hepatitis B viral envelope protein.

14. A pharmaceutical composition for modulating systemic immunity in a mammal, the composition comprising a macromolecular aggregate of a peptide and a suitable carrier, in an amount sufficient to induce systemic immunity when administered to a mammal transmucosally.

15. A pharmaceutical composition for inducing systemic immunity in a mammal, the composition comprising a macromolecular aggregate of a peptide and a suitable carrier, in an amount sufficient to induce systemic immunity when administered to a mammal transmucosally.

16. A method of suppressing an immune response to a peptide in a mammal already immune to said peptide, the method comprising transmucosally administering to the mammal a macromolecular aggregate of the peptide, thereby suppressing an immune response to a peptide in a mammal.

17. The method of claim 16, wherein the macromolecular aggregate is less than 1 nm in diameter.

18. The method of claim 16, wherein the macromolecular aggregate comprises 10 or less peptide subunits.

19. The method of claim 16, wherein the macromolecular aggregate comprises a physical association of two or more units.

20. The method of claim 16, wherein the macromolecular aggregate is selected from the group consisting of a dimer and a multimer.

21. The method of claim 16, wherein the macromolecular aggregate has a molecular weight of 1,000 kD or less.

22. The method of claim 16, wherein the macromolecular aggregate is resistant to digestive degradation.

23. The method of claim 16, further comprising stabilization of the macromolecular aggregate in aggregate form by chemical treatment.

24. The method of claim 16, further comprising stabilization of the macromolecular aggregate in aggregate form by recombinant protein engineering of the peptide.

25. The method of claim 24, further comprising stabilization of the macromolecular aggregate in aggregate form by chemical treatment.

26. The method of claim 16, wherein the peptide comprises a hepatitis B virus protein.

27. The method of claim 26, wherein the peptide is selected from the group consisting of a hepatitis B viral surface protein, a hepatitis B viral nucleocapsid protein, and a hepatitis B viral envelope protein.

28. A pharmaceutical composition for suppressing an immune response in a mammal, the composition comprising a macromolecular aggregate of a peptide and a suitable carrier, in an amount sufficient to suppress an immune response when administered to a mammal transmucosally.

29. A method of suppressing an immune response in a mammal, the method comprising transmucosally administering to the mammal monomolecular peptide, thereby suppressing an immune response in the mammal.

30. The method of claim 29, wherein said peptide is resistant to digestive degradation.

31. The method of claim 29, further comprising stabilization of said peptide in monomeric form by chemical treatment.

32. The method of claim 29, further comprising stabilization of said peptide in monomeric form by recombinant protein engineering of the peptide.

33. The method of claim 29, further comprising stabilization of said peptide in monomeric form by chemical treatment.

34. The method of claim 29, wherein the peptide comprises a hepatitis B virus protein.

35. The method of claim 34, wherein the peptide is selected from the group consisting of a hepatitis B viral surface protein, a hepatitis B viral nucleocapsid protein, and a hepatitis B viral envelope protein.

36. A pharmaceutical composition for suppressing an immune response in a mammal, the composition comprising a monomeric peptide and a suitable carrier, in an amount sufficient to suppress an immune response when administered to a mammal transmucosally.

37. A method of modulating a systemic immune response to an antigen in a mammal, the method comprising transmucosally administering to the mammal a non-peptide macromolecular aggregate, thereby modulating a systemic immune response in the mammal.

38. A method of inducing a systemic immune response to an antigen in a mammal, the method comprising transmucosally administering to the mammal a non-peptide macromolecular aggregate, thereby inducing a systemic immune response in the mammal.

39. The method of claim 37 or 38 wherein the aggregate is a homogeneous aggregate comprised of a component selected from the group consisting of a carbohydrate, a lipid, and a chemical compound.

40. The method of claim 37 or 38, wherein the aggregate is heterogeneously comprised of at least two components, and further wherein the components are each selected from the group consisting of a ligand, a carbohydrate, a lipid and a chemical compound, and any combination thereof.

41. The method of claim 37 or 38, wherein the macromolecular aggregate comprises at least 10 component subunits.

42. The method of claim 37 or 38, wherein the macromolecular aggregate comprises a physical association of two or more units.

43. The method of claim 39, wherein the macromolecular aggregate is selected from the group consisting of a dimer and a multimer.

44. The method of claim 37 or 38, wherein the macromolecular aggregate comprises at least one of the members selected from the group consisting of twenty non-peptide subunits, an aggregate of a molecular weight in excess of 1,000 kD, and a combination of twenty non-peptide subunits and an aggregate of a molecular weight in excess of 1,000 kD.

45. The method of claim 37 or 38, wherein said aggregate is at least 1 nm in diameter.

46. The method of claim 37 or 38, wherein the macromolecular aggregate is at least 5 nm in diameter.

47. The method of claim 37 or 38, wherein the macromolecular aggregate is resistant to digestive degradation.

48. The method of claim 37 or 38, further comprising stabilization of the macromolecular aggregate in aggregate form by chemical treatment.

49. A method of suppressing an immune response in a mammal, the method comprising transmucosally administering to the mammal monomolecular non-peptide molecule, thereby suppressing an immune response in the mammal.

50. The method of claim 49, wherein said non-peptide molecule is resistant to digestive degradation.

51. The method of claim 49, further comprising stabilization of said non-peptide molecule in monomeric form by chemical treatment.

52. The method of claim 49, further comprising stabilization of said non-peptide molecule in monomeric form by recombinant protein engineering of the peptide.

53. The method of claim 52, further comprising stabilization of said non-peptide molecule in monomeric form by chemical treatment.

54. A method of suppressing an immune response to an antigen in a mammal, the method comprising transmucosally administering to the mammal a monomeric non-peptide antigen, thereby suppressing said immune response in said mammal.

55. A pharmaceutical composition for suppressing an immune response to an antigen in a mammal, the composition comprising a monomeric non-peptide antigen and a suitable carrier, in an amount sufficient to suppress an immune response to said antigen in said mammal when administered to a mammal transmucosally.

56. A method of modulating a systemic immune response to an antigen in a mammal, the method comprising transmucosally administering to the mammal a macromolecular aggregate, and further wherein said aggregate is comprised of at least one peptide subunit and at least one non-peptide subunit, thereby modulating a systemic immune response in the mammal.

57. A pharmaceutical composition for inducing systemic immunity in a mammal, the composition comprising a non-peptide macromolecular aggregate and a

suitable carrier, in an amount sufficient to induce systemic immunity when administered to a mammal transmucosally.

58. A pharmaceutical composition for inducing systemic immunity in a mammal, the composition comprising a macromolecular aggregate and a suitable carrier, wherein said aggregate is comprised of at least one peptide subunit and at least one non-peptide subunit, in an amount sufficient to induce systemic immunity when administered to a mammal transmucosally.

59. The method of claim 1 or 2, wherein the macromolecular aggregate is at least 1 nm in diameter.